

# **METHOD FOR PROVIDING A SELF-PINNED DIFFERENTIAL GMR SENSOR AND SELF-PINNED DIFFERENTIAL GMR SENSOR**

## **ABSTRACT**

5           A method for providing a self-pinned differential GMR sensor and self-pinned  
differential GMR sensor. The differential GMR head includes two self-pinned GMR  
sensors separated by a gap layer. The gap layer may act as a bias structure to provide  
antiparallel magnetizations for the first and second free layers without using an  
antiferromagnetic layer. The gap layer may include four NiFe ferromagnetic layers  
10       separated with three interlayers. The gap may also be formed to include a structure  
defined by Ta/Al<sub>2</sub>O<sub>3</sub>/NiFeCr/CuOx. One of the pinned layer may include three  
ferromagnetic layers so that the top ferromagnetic layer of the bottom pinned layer and  
the bottom ferromagnetic layer of the bottom pinned layer have a magnetization 180° out  
of phase. The self-pinned GMR sensors may include synthetic free layers that includes a  
15       first free sublayer, an interlayer and a second free sublayer that are biased 180° out of  
phase.